

## REMARKS

By this amendment, a supplemental Declaration is submitted, the specification is revised, claims 1-5 are canceled, and new claims 6 and 7 are added to place this application in condition for allowance. Currently, claims 6 and 7 are before the Examiner for consideration on their merits.

First, the specification has been revised to resolve the objections to the drawings. That is, the "body 51" is now characterized as the "body 1." The reference to "A" for the heater chip is changed to "A1". These changes make the specification consistent with the drawings and the drawing objection should be withdrawn.

Second, the issues of indefiniteness in claims 1-5 are rendered moot by their cancellation and replacement with claims 6 and 7, which are believed to be in full compliance with 35 U.S.C. § 112, second paragraph.

Third, claims 6 and 7 are fully supported by the original specification. New claim 6 contains elements of claims 1-4, see paragraphs [0052-0057] of Applicant's published application. Claim 7 is a more defined version of claim 5 and is supported by paragraph [0059].

Fourth, a supplemental Declaration is submitted as requested by the Examiner.

Lastly, Applicant submits that the prior art rejection is no longer valid in light of the submission of claim 6.

As background, the invention is an improvement over an earlier model of a heater chip as is best seen in prior application (JP2002-139566 or WO03/097288A1). The priority date of this application (August 22, 2003) is before the publication of the prior application's publication date (November 27, 2003). Therefore, the prior application

should not be considered to be in the public domain. Nevertheless, the prior model is not without its drawbacks given the current method of soldering using lead free solder and diffusion bonding.

Currently and as lead-free solder alloy and diffusion bonding are becoming widely used, the thermocompression bonding portion of the heater chip is highly heated (between 600 and 800 °C) in a very short time. This can be seen in the attached Reference drawing No. 1, which shows the difference of time-temperature relation between the current invention and the prior art.

In the prior art, the thermocompression bonding portion of the conventional heater chips and their method of use has a large area, which makes it difficult to obtain an instantaneous high temperature. An example of such a large bonding portion can be seen in United States Patent No. 5,297,716 to Smith, which is used as the principle reference in rejecting the claims. Smith, in Figure 4, illustrates a bonding portion 100, which is the central region between the two legs 80 and 82

Also, in the case where the thermocompression bonding portion is instantaneously heated, heat expansion may occur around the welding area of the temperature-detecting portion of the thermocouple. Eventually, the thermocouple will come off from the contact face, which is illustrated in the attached Reference Drawing No. 2. In order to correctly detect the instantaneous high temperature, the welding area should be properly contacted. By virtue of the inventive heater chip, the high temperature is detected in a very short time so that the welding area should not be easily changed due to the heat expansion.

Turning now to the prior art rejection, the issue now is whether Smith alone or

with any of the other art of record renders obvious claim 6. Since claim 6 includes features found in claims 3 and 4, and these claims were rejected under 35 U.S.C. § 103(a), the rejection based on 35 U.S.C. § 102(b) is now moot.

Applicant submits that Smith does not teach or suggest all of the features of claim 6 and a further rejection cannot be made

Claim 6 now defines a heater chip including the features of:

(1) a dilated trapezoidal cut is provided deep inside the cut forming the conduction terminal portion;

(2) a projection portion for thermo-welding with 0.4 millimeter or more length provided opposite to the thermocompression bonding portion;

(3) a temperature-detecting portion which is created by thermally welding each end of two conducting wires which makes up the thermocouple to the projection portion, wherein

(4) the thermal welding is characterized in that the wet melting portion spreads and covers up the top and bottom ridges of the head area of the projection portion.

These features solve the problems noted above in the prior art and the inability to be able to rapidly detect the sharp increase in temperature when the heater chip is used while avoiding the damage to the thermocouple by the sharp increase in temperature.

Smith discloses several different methods to install the temperature detecting portion of the thermocouple to the heater chip, 102, 130, and 132. In each instance, the thermocouple cables are inserted into a groove and fixed therein by a spring, see Figures 7 and 8, or inserted into a through opening and attached together at the distal

end of the cables, see Figures 6A-6C. In Figures 4 and 5, the cables are inserted into the protrusion 102, which is then deformed to hold the cable ends. The cable ends can be placed in the protrusion in a non-fused state and attached together by means of the deformation of the protrusion 102 or can be fused prior to the deformation step. In all instances, the cable ends are inserted into a hole, and fixed. This is problematic in that the cables have either point or line contact and are not as capable of detecting the rapid increase in temperature that is present in current thermocompression bonding methods.

In claim 6, the ends of the conducting wires are welded to the protection portion, with the wet melting portion covering the top and bottom ridges of the head area of the projection portion.

Notwithstanding the rejection, this feature is not found in Smith. In the rejection, the Examiner makes two contentions to support the rejection of claims 3 and 4. The first is that it would be mere engineering expediency "as Smith clearly teaches the use of melting two wires together to provide a thermocouple and bond to a central region... ." This position is flawed since it assumes that Smith teaches welding to a central region as was stated in claims 3 and 4 and is now found in claim 6. Smith does not teach the claimed welding configuration. At best, Smith teaches bonding the ends of the wires together by welding and then securing the ends to the central region by a spring, engagement with a bore and deformation. There is no welding to a projection portion as recited in claim 6.

In addition, the argument that engineering expediency supports an obviousness rejection is misplaced. The melting of the wires and any wet spreading would be associated with the wires themselves in Smith. While engineering expediency may apply

in this situation, it cannot apply to the wet spreading onto the central region when there is no hint in Smith of a welding of the wires to the central region. Without this, the Examiner's assertion of obviousness lacks the required reasoning.

It is also argued that claim 7 is separately patentable over Smith. Claim 7 calls for an additional "small cut" at the midpoint of the cut serving as a conduit terminal portion so that there are three defined cuts. In the rejection, the Examiner alleges that the wider portion of the cut formed by the legs 80 and 82 is the cut defined in original claim 5. This logic cannot stand since taking this position to account for the "small cut" means that the dilated cut is not accounted for in the rejection. Since Smith fails to teach the combination of "cuts" as defined in claim 5, this reference cannot render this claim obvious. Moreover, there is no reason to provide the claimed "small cut" and any allegation that it would be obvious to alter Smith to include such a feature would be hindsight.

To summarize, Smith fails to establish a *prima facie* case of obviousness against each of claims 6 and 7 since there is no reason to modify Smith to include the features of these claims, and the claimed features cannot be considered to be design choices or engineering expediency.

Accordingly, the Examiner is respectfully requested to examine this application in light of this amendment and pass all pending claims onto issuance.

If the Examiner believes that an interview would be helpful in expediting the allowance of this application, the Examiner is requested to telephone the undersigned at 202-835-1753.

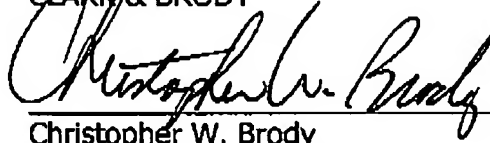
Again, reconsideration and allowance of this application is respectfully requested.

Application No.: 10/568,591

The above constitutes a complete response to all issues raised in the Office  
Action dated April 14, 2008.

Please charge any fee deficiency or credit any overpayment to Deposit Account  
No. 50-1088.

Respectfully submitted,  
CLARK & BRODY

A handwritten signature in black ink, appearing to read "Christopher W. Brody", is written over a horizontal line.

Christopher W. Brody  
Registration No. 33,613

**Customer No. 22902**  
1090 Vermont Avenue, N.W., Suite 250  
Washington DC 20005  
Telephone: 202-835-1111  
Facsimile: 202-835-1755

Docket No.: 12056-0021  
Date: July 10, 2008

**Attachment to Amendment filed 7/10/08  
for U.S. Application No. 10/568,591**

**Applicant: Tatsuya ISHII**

**Docket No. 12056-0021**

**Total pages of attachment: 1**

**ATTACHMENT NO. 1 of 3**

**Attachment to Amendment filed 7/10/08  
for U.S. Application No. 10/568,591**

**Applicant: Tatsuya ISHII**

**Docket No. 12056-0021**

**Total pages of attachment: 1**

**ATTACHMENT NO. 2 of 3**



**Attachment to Amendment filed 7/10/08  
for U.S. Application No. 10/568,591**

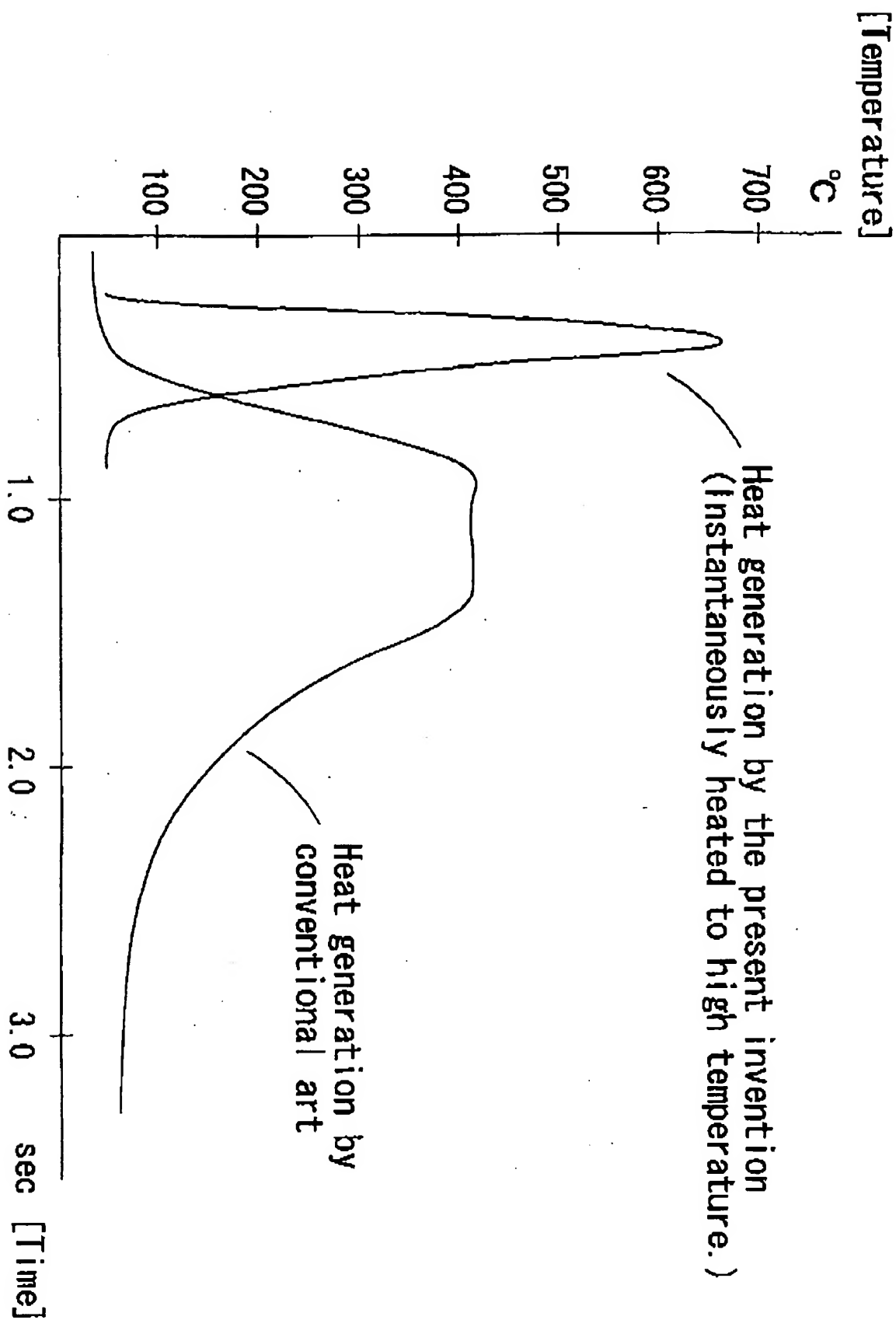
**Applicant: Tatsuya ISHII**

**Docket No. 12056-0021**

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**ATTACHMENT NO. 3 of 3**

## Reference Drawing 1



## Reference Drawing 2

